The Daedalean

Semper Discens

Monthly Aerospace Education Publication of the Connecticut Wing of the Civil Air Patrol

Stephen M. Rocketto, Maj., CAP
Director of Aerospace Education
CTWG
srocketto@aquilasys.com

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OUR SIXTH YEAR OF PUBLICATION

SCHEDULE

12 FEB-Dr. Sherra Kerns speaking at 143rd

23 MAR-CTWG Cadet Competition
MAR-TBD--SLS-Camp Niantic

27 APR-PT at USCGA (0800-1000)
26-27 APR-CTWG Encampment Staff Training
TBD-Commander's Cup Rocketry Competition

7-8 JUN-CTWG Encampment Staff Training

09 JUL-CTWG KC-10 O Flight (Tuesday)
21 JUL0-03 AUG-NESA-Camp Atterbury, IN
27 JUL-CADET Ball-USCGA

10 AUG to17AUG-CTWG Encampment

ANNUAL REPORTS OVERDUE

The annual squadron aerospace education report plan of action, and Brewer Award nominations were due by 15 January. squadron commanders and AEOs in default have been notified in a separate e-mail.

SQUADRON AEROSPACE NEWS

143rd Composite Squadron
Waterbury

The Squadron worked on Phase One of the Model Rocketry Program. Eight cadets completed Phase One and nine are expected to finish the requirements in February.

Thames River Composite Squadron
Groton

Thames River received the Aerospace Excellence Award Plaque marking the eighth successive year in which the Squadron has met the requirements. Maj Roy Bourque was commended for leading this long term effort.

C/Maj Brendan Flynn has received an appointment to the USCG Academy. Flynn joins squadron mate C/1stLt Drew Daniels who received a Letter of Assurance for Admission to the Academy earlier.

Cadets Flynn and Daniels

Cadet Flynn was also awarded a book, *Aloft, A Life Well Spent by Capt* Arthur H. Wagner, (USCG, Ret'd.) for his achievement of the FAA Private Pilot rating late last year. The book was signed by his three instructors: LtCol John deAndrade, CFII, Maj Keith Nelson, CFI, and Maj Stephen Rocketto, AGI.

One Saturday was devoted to working on rockets for the upcoming season and utilizing desk top flight simulators to learn about piloting skills and aviation history. Eight systems were in operation and cadets engaged in activities from flying the pattern to dogfighting in historic aircraft.

AEROSPACE SPEAKER

12 February, 2013

Dr. Sherra Kerns, internationally renowned Engineer and Space Electronics expert and 2013 NAE Gordon Award co-recipient will be speaking at the 143rd Composite Squadron meeting on Tuesday, the 12th of February. Dr. Kerns will also present C/2dLt Rebecca Lange with her Mitchell certificate.

AEROSPACE CURRENT EVENTS

MATERIALS IN AEROSPACE
"Sharkskin Coatings"

When you are high up on the food chain and your prey is swift, speed helps fill the belly. Aerodynamics is just a sub-discipline of hydrodynamics and aero engineers have noted that the sharp scales of the shark reduce frictional drag. A number of experiments have been conducted to see if a "sharkskin-like surface is an efficacious skin for aircraft.

The application of rough surfaces to decrease the coefficient of drag seems contradictory since one would think a smooth surface is more "slippery." However, a certain speeds, a rough surface

Several Airbus aircraft have been used to run experiments which explore the manifold mysteries of skin friction. The dearth of a strong theoretical underpinning in the field results in a reliance on empirical data, the accumulation of which depends upon real world testing.

A number of problems have arisen in attempting to use "shark skin" surfaces in aerodynamic applications. First, the best texture must be determined. Next, the material must be durable resisting both weather erosion (hail and wind borne particles), ultraviolet (solar) degradation, chemical actions (fuel and deicers) and mechanical shock from foreign objects. Resistance to dirt is also important in order to preserve the optimum texture. In addition, it must be cost efficient, both in manufacture, application, and upkeep. As the price of fuel rises, the benefits of drag reduction increase.

Special skins are not new to aircraft. The editor once checked a chip of paint off an SR-71 and determined that it had magnetic properties. The coating on the B-2 is so delicate that it it requires special treatments after each flight. The few bases which handle the aircraft have special hangars which are equipped to function as a kind of "beauty salon" for the beast.

Golf ball have dimples and the dimpling technique has been used on racing yacht hulls. But dirt or marine growth can degrade the performance. Suits for competitive swimmers make claims for improved performance based upon the special properties of the fabric Apparently roughing a surface can cut drag by reducing the turbulence near the boundary layer..

An then of course there is the sharkskin coat. It won' t help you run faster to escape a mugger but you can conceal a short barreled shotgun slung on a rope in case the assailant gets too close!

MATERIALS IN AEROSPACE
"Lithium-Ion"

Boeing has run into trouble with its new 787 Dreamliner. The revolutionary aircraft, the first major airliner to use composite materials as primary parts of the airframe, has been grounded due to two fires involving lithium-ion batteries.

Lithium-ion batteries can be a fire hazard. A UPS Boeing 747 crashed in Dubai when the crew was overcome by smoke cause by fire in a cargo of lithium-ion batteries. Before the ANA inflight fire in Japan and the JAL ground fire in Boston, both airlines have reported a number of times batteries have been replaced for various reasons.

Boeing was allowed to use the batteries in the new 787 when it designed special safeguards required by the FAA.

The company decided to use the battery since the new airliner required large amounts of electrical power and the lithium-ion battery has more energy per unit weight than competing batteries.

Boeing hopes that the investigation concludes quickly and the 50 grounded airliners are released for flight. They are continuing to produce the

aircraft but expect to take some monetary losses due to the fires.

Ironically, at the same time, the International Air Transport Association which represents US carriers which fly internationally won an exemption to the rules on flying certain Li-O batteries as cargo in passenger aircraft.

Aircraft batteries up to 77 pounds may be shipped although Li-O batteries greater than 11 pounds are prohibited! The batteries in the Boeing 787 weight 63 pounds each.

The airlines want the exception so that they can swiftly move aircraft batteries to a grounded airliner and it is often faster to use a passenger carrying aircraft.

Some experts question the exemption. Chesley Sullenberger, Captain of the Airbus which successfully ditched in the Hudson River, stated that he would not be comfortable flying an aircraft with Li-O battery cargo due to the potential for a high intensity fire.

MATERIALS IN AEROSPACE
Ceramics

AIRBORNE LASERS ARE BACK

The USAF and the Defense Advanced Research Projects Agency ended its airborne laser project in the winter of 2012 after 16 years and five billion dollars in expenses.

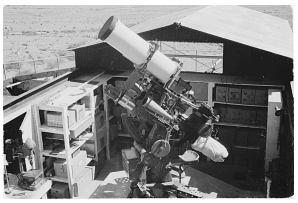
Boeing NKC-135A was used in airborne laser tests from 1975 to 1984.

Boeing 747-400F used in follow-up tests was retired to AMARC in 2012. (USAF Photo)

However, a novel new laser design has resurrected interest in using airborne lasers as weapons. The major problem with using continuous beam lasers is that they overheat. Cooling them requires refrigeration units which add weight and complexity.

Lasers can use solid state or fluid materials in which the molecules are boosted to high energies. Solid state lasers are generally more powerful but the heat developed requires pulsing rather than a steady beam operation.

Many years ago, the Editor was involved in a project in which a relatively low power laser to range satellites at distances on the order of distances of hundreds of miles. The laser was a ruby rod type and fired two shots each minute. Cooling was a problem solved by fastening the station vacuum cleaner to the laser mount and blowing air through the tube!



White Sands Laser

Laser Control Panels

One of the new 150 kW laser which DARPA is studying for its High Energy Area Defense System uses a proprietary ceramic combined and a liquid which has the same angle of refraction as the laser mirrors. The liquid dissipates heat while operating and reduces the necessity for complex external cooling.

Israel is also involved in the laser weapon field as part of its missile defense system. The lower energy lasers under consideration would, if successfully developed, be used to counter threats such as drones, small craft, missiles, and artillery shells.

However, the laser is not a panacea weapon, a weapon for all seasons. Laser efficiency demands good visibility, free of obscuring dust or water vapor. One waits to see the results of the new test and the anticipated price of developing and deploying these weapons.

AEROSPACE HISTORY

For some weeks, we have been running a series on defunct airlines in the *The Daedalean's* companion newsletter, *The Coastwatcher.* Here are couple of examples of pioneering commuter airlines.

Southeast Connecticut's Pilgrim Airlines was founded by Joseph M. Fugere, a US naval aviator at the Waterford Airport. The company flew Beech 18s and and Piper aircraft as an air taxi service for customers such as Electric Boat.

As the business grew, Fugere moved the operation to Trumbull Airport in Groton and pioneered the concept of the regional airlines when Pilgrim became the first to introduce the DeHavilland of Canada. DHC-6 Twin Otter into scheduled service.

N125PM, a DHC-6-100 at GON now employed in the Western US as a jump aircraft.

Over time, the route structure expanded until flights covered destinations ranging from Washington to Toronto and Ottawa and Montreal. The faithful "Twatters" were eventually replaced by Beechcraft 1900's reinforced by Beech 99s, a Fokker F-27 and F-28, and even a Beech Volpar conversion, a fleet of over two dozen aircraft.

Rumor has it that the Pilgrim Volpar, a conversion of the Beech 18, was a former Air American aircraft however, this cannot be substantiated after a search of the Beech and Volpar construction number records.

One of the more unique of Joe Fugere's fleet was the Conroy converted Super DC-3 which had two Rolls-Royce Dart turboprops replacing the piston engines. The aircraft, registered as N156WC never entered service.

The story is that Fugere found it unsuitable for his airline since its small diameter props and large diameter engine nacelles could not provide the necessary thrust, requiring a 6,000 foot runway, some 1,000 feet more than that available at Groton. As a result, the aircraft was tied down near a taxiway. On a winter night in 1984, a taxiing TransAmerican Lockheed L-100 put its wing through the nose and cockpit which supposedly "totaled" the aircraft. However, if one checks the FAA registry, it is still on the books as N156PM. The registration is in the name of Pilgrim and expires in June of 2013!

Turbo Gooney Bird

Herr Heinz Rentmeister, Cologne, Germany, has graciously given us permission to publish his photo of the damaged aircraft which he took in June of 1984. The picture was posted in *Flugzeugbilder.de,* a most interesting collection, which I commend to all of you.

The Pilgrim crew, base, and administrative roster included an extraordinary cast of characters, many of whom went on to achieve success in the airline industry.

Pilgrim's F-28, here at JFK, was one of the first jets introduced to regional airline fleets. The classic "Pilgrim Hat" logo was replaced by the "tutsi fruitsi" motif.

In 1981, Pilgrim acquired New Haven Airways (NewAir) but in 1982, sold his interests to Business Express which eventually became the first Delta Connection carrier and ultimately ended up with American Eagle!

One aircraft still flies with Pilgrim colors. Formerly the Pilgrim hack, the Piper PA-24 Comanche is based at WST.

Fugere retired to his farm and operated an aircraft brokerage service. He went west in 2001.

Piedmont Airlines

Piedmont Airlines was founded in South Carolina in 1949 and lasted for four decades.

A DC-3 in Piedmont colors is maintained in airworthy conditions by the Carolinas Aviation Museum in Charlotte. Note drip pans and tow bar.

Originally, Piedmont connected city pairs in the Carolinas, mid-Atlantic, and mid-west. They gradually expanded their route structure as far west as Colorado and after deregulation, set up a hub and spoke system and started international service between Charlotte and London.

The Nihon YS-11A-205 was developed to meet Piedmont requirements for an aircraft able to lift a higher gross weight than the original YS-11.

The YS-11 is the only Japanese built airliner to enter service with U.S air transport carriers.

Its customer base and route structure made it a suitable object for acquisition and a buyout occurred in 1989. Piedmont is now part of US Airways.

Oddly, the name Piedmont Airlines lives on in what was the former Henson Airlines which operates out of the Wicomico Regional Airport, Salisbury, Maryland at the head of the DelMarVa Peninsula. As best as can be determined, Henson came under the control of USAir and they renamed Henson to Piedmont to protect the brand name.

Henson, founded by the visionary Richard Henson, was the first of the commuter airlines, starting his operation in 1962 with the venerable Beech 18.